Cypress Semiconductor
Product Qualification Report

QTP# 082609 VERSION 1.0
June 2009

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CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

QUAL REPORT	DESCRIPTION OF QUALIFICATION PURPOSE	DATE COMP.
065201	Qualify FX2LP18 Device Family on C8Q-3R Technology at GSMC Foundry (Fab 5)	Sep 07
082609	Qualify HX2LP (7C65630C, USB High Speed HUB) at GSMC on C8Q-3R	Jun 09

Cypress products are manufactured using qualified processes. The technology qualification for this product is referenced above and must be considered to get a complete and thorough evaluation of the reliability of the product.

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose:	Qualify HX2LP (7C65630C, USB High Speed HUB) at GSMC on C8Q-3R
Marketing Part #:	CY7C656205, CY7C656305
Device Description:	3.3V 24Mhz High-Speed USB 2.0 Hub
Cypress Division:	Cypress Semiconductor Corporation – Consumer and Computation Division

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	4	Metal Composition:	Metal 1: 100A Ti/3,200A Al 0.5% Cu/300A TiW Metal 2: 150A Ti/4,230A Al 0.5% Cu/300A TiW Metal 3: 150A Ti/4,230 Al 0.5% Cu/300A TiW Metal 4: 150A Ti/8,000 Al 0.5% Cu/300A TiW
Passivation Type and Materials:			1000Å TEOS / 9000Å Si_3N_4
Generic Process Technology/Design Rule (µ-drawn):			CMOS, 0.13µm
Gate Oxide Material/Thickness (MOS):			SiO_2 /55A
Name/Location of Die Fab (prime) Facility:			GSMC China
Die Fab Line ID/Wafer Process ID:			Fab5, C8Q-3R

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
56-QFN	**CML-RA, L-Korea, AE-Shanghai**

Note: Package Qualification details available upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LY56
Package Outline, Type, or Name:	56-Lead QFN
Mold Compound Name/Manufacturer:	Sumitomo EME-G700
Mold Compound Flammability Rating:	V-O per UL94
Mold Compound Alpha Emission Rate:	N/A
Oxygen Rating Index:	N/A
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Matte Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Punch
Die Attach Supplier:	Ablestik
Die Attach Material:	Ablebond 8290
Die Attach Method:	Epoxy
Bond Diagram Designation:	10-06541, 10-06493
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0mil
Thermal Resistance Theta JA °C/W:	101 °C/W
Package Cross Section Yes/No:	No
Assembly Process Flow:	001-09888
Name/Location of Assembly (prime) facility:	SEOUL-KOREA (L)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Human Body Model (HBM)	2200V JESD22, Method A114-E	P
Electrostatic Discharge Charge Device Model (CDM)	500V Cypress Spec. 25-00020	P
High Accelerated Saturation Test (HAST)	130°C, 3.65V, 85%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc=3.8V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc=3.8V, 150°C	P
High Temperature Steady State life	Static Operating Condition, Vcc= 3.63V, 150°C	P
High Temperature Storage	150C, no bias	P
Low Temperature Operating Life	Dynamic Operating Condition, Vcc=4.3V, -30°C	P
Pressure Cooker	121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Static Latchup	125C, 5.1V, ± 200mA Cypress Spec. 01-00081	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Acoustic Microscopy	Cypress Spec. 25-00104	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal[3] A.F	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	3,000 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	362,000 DHRs	0	0 .7	170	15 FIT

[1] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

where:

E_A =The Activation Energy of the defect mechanism.
k = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.
T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 065201

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	COMP	15	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	COMP	15	0	
CY7C68053 (7C680510BK)	4727325	610739937	TAIWN-G	COMP	15	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	COMP	9	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, 2200V							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	COMP	8	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	COMP	8	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.63V)							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	80	80	0	
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	48	338	0	
CY7C68053 (7C680510BK)	4720785	610731288	CML-R	48	348	0	
CY7C68053 (7C680510BK)	4727325	610739215	CML-R	48	340	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	80	182	0	
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	500	182	0	
CY7C68053 (7C680510BK)	4720785	610731288	CML-R	80	182	0	
CY7C68053 (7C680510BK)	4720785	610731288	CML-R	500	182	0	
CY7C68053 (7C680510BK)	4727325	610739215	CML-R	80	180	0	
CY7C68053 (7C680510BK)	4727325	610739215	CML-R	500	180	0	

Reliability Test Data

QTP #: 065201

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.65V), PRE COND 192 HR, 30C/60%RH, MSL3							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	128	50	0	
CY7C68053 (7C680510BK)	4720785	610731288	CML-R	128	45	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 4.3V)							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	500	45	0	
STRESS: STATIC LATCH-UP TESTING (125C, ±200mA)							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	COMP	3	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	COMP	6	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	500	50	0	
CY7C68053 (7C680510BK)	9714792	610721250	CML-R	1000	50	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR, 30C/60%RH, MSL3							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	168	48	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	168	50	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS, 30C/60%RH, MSL3							
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	300	50	0	
CY7C68053 (7C680510BK)	9714792	610721014	TAIWN-G	1000	50	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	500	50	0	
CY7C68053 (7C680510BK)	4720785	610729797	TAIWN-G	1000	50	0	
CY7C68053 (7C680510BK)	4727325	610739937	TAIWN-G	300	50	0	

Reliability Test Data

QTP #: 082609

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, 2200V							
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	COMP	8	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	48	1000	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
CY7C656305 (7C656305DK)	4838922	610849516	SEOUL-L	96	1000	0	
CY7C656305 (7C656305DK)	4838922	610849514	SEOUL-L	96	1000	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	80	180	0	
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	500	180	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5.1V, ±200mA)							
CY7C656305 (7C656305DK)	4838922	610849515	SEOUL-L	COMP	6	0	